Ozone Data from Satellites at GES DISC

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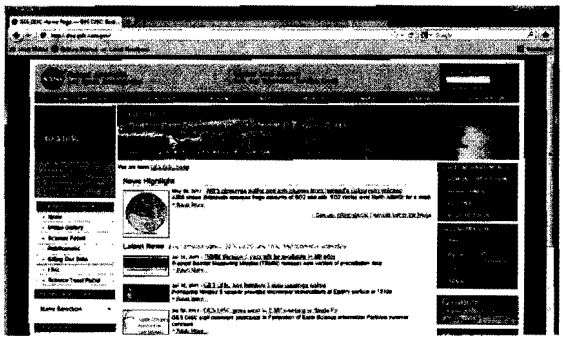
Goddard Earth Science (GES) Data and Information Services Center (DISC)

- Home (archive) of NASA Precipitation and Hydrology, as well as **Atmospheric Composition** and Dynamics, data and information
- Information Services: developing tools and services that promote easier use and usability of earth science data and information

GES DISC disc.gsfc.nasa.gov



Ozone Data from Satellites

- GES DISC Atmospheric Composition portal http://disc.gsfc.nasa.gov/acdisc
- Completed coverage from heritage (Nimbus TOMS, etc.) to most recent (Aura OMI, etc.)

Key Ozone Data Sets at GES DISC

Missions	Nimbus 4	Nimbus 7	Nimbus7/ Meteor3 ADEOS I Earth Probe	Nimbus 7	UARS			
Instruments	BUV	SBUV	TOMS	LIMS	CLAES	HALOE	ISAMS	MLS
Data Period	Apr 70-May 77	Nov 78-May 93	Nov 78-Dec 05	Oct 78-May 79	Oct 91-May93	Oct 91-Present	Sep 91-Jul 92	Sep 91-Jul 99
Spectral Region	255-380 nm	255-340 nm	309-360 312-340 nm	6.2-15 μm	3.5-12.7 μm	2.43-10.25 μm	4.6-16.8 μm	63, 183, 205 GHz

From Ahmad *et al.* 2005

Key Ozone Data Sets at GES DISC (Continued)

Missions	Aqua	Aura				
Instruments	AIRS	OMI	HIRDLS	MLS	TES*	
Data Period	Sep 02-Present	Jul 04-Present	Jul 04-Present	Jul 04-Present	Jul 04-Present	
Spectral Region	0.4-1.1 3.74-15.4 μm	270-500 nm	6.12-17.76 μm	118,190 240, 640 GHz 2.5 THz	3.3-15.4 μm	

*Data from the Aura instrument TES is archived at the NASA Langley Atmospheric Sciences Data Center (http://eosweb.larc.nasa.gov/), available in Giovanni.

From Ahmad *et al.* 2005

Instrument Acronyms

Instruments	Acronyms
BUV	Backscatter Ultraviolet
SBUV	Solar Backscatter Ultraviolet
TOMS	Total Ozone Mapping Spectrometer
LIMS	Limb Infrared Monitor of the Stratosphere
CLAES	Cryogenic Limb Array Etalon Spectrometer
HALOE	Halogen Occultation Experiment
ISAMS	Improved Stratospheric and Mesospheric Sounder
MLS	Microwave Limb Sounder

Instruments	Acronyms
AIRS	Atmospheric Infrared Sounder
OMI	Ozone Monitoring Instrument
HIRDLS	High Resolution Dynamics Limb Sounder
MLS	Microwave Limb Sounder
TES	Tropospheric Emission Spectrometer

Total Column Ozone and Ozone Profile

Instruments	Total Column Ozone	Ozone Profile
BUV	X	X
SBUV	X	X
TOMS	X	
LIMS		X
CLAES		X
HALOE		X
ISAMS		X
MLS		X

Instruments	Total Column Ozone	Ozone Profile
AIRS	X	X
OMI	X	X
HIRDLS		X
MLS		X
TES	X	X

Two Examples: TOMS and OMI

- Two instruments dedicated to ozone observation
- Total Ozone Mapping Spectrometer (TOMS)
- Ozone Monitoring Instrument (OMI)

TOMS

- On Nimbus-7, Meteor 3, ADEOS 1, and Earth-Probe satellites
- Continuous, long-term monitoring of atmospheric ozone
- Available Data Period:

  Nimbus 7: November 1, 1978 – May 1993

  Meteor 3: August, 1991 – November 1994

  ADEOS 1: July 1996 – June 1997

  Earth-Probe: July 1996 – December 2005

TOMS Ozone Data Products

- Level-2 data

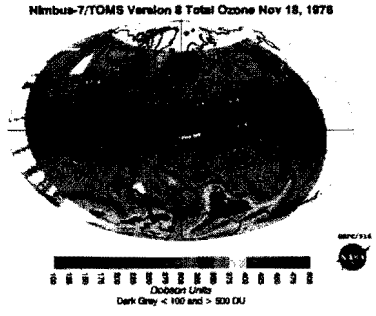
  Orbital (pixel level) Data, 50km by 50km at nadir

  Total Column Ozone (Dobson Unit)
- Level-3 data

  Global Gridded Data (1 degree in latitude by 1.25 degrees in longitude)

  Total Column Ozone (Dobson Unit) averaged into daily grid cells
- Daily Zonal Means
- TOMS Ozone over 754 selected locations

TOMS Daily Ozone Sample



http://toms.gsfc.nasa.gov

OMI

- On Aura satellite launched July 15, 2004
- Scientific Missions:

  Is the ozone layer recovering as expected?

  What are the sources of aerosols and trace gases that affect global air quality and how are they transported?

  What are the roles of tropospheric ozone and aerosols in climate change?

  What are the causes of surface UV-B change?
- Available Data Period:

  July 2004 - present

OMI Ozone Data Products

- Level-2 data

  Orbital (pixel level) Data, 13km by 24km at nadir

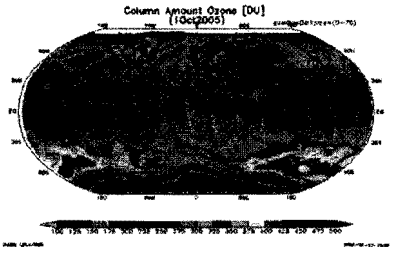
  Total Column Ozone (Dobson Unit): TOMS V8 and DOAS (Differential Optical Absorption Spectroscopy) method

  Ozone Pofile
- Level-3 data

  Global Gridded Data (1 degree by 1 degree and 0.25 degree by 0.25 degree)

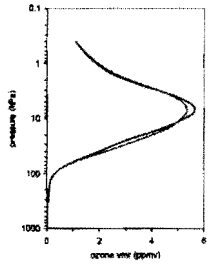
  Total Column Ozone (Dobson Unit) averaged into daily grid cells

OMI Daily Ozone Sample



Ozone from US TOMS-like algorithm (P.I. P. K. Bhartia, NASA/GSFC)

OMI Ozone Profile Sample



Ozone profile from KNMI algorithm (P.I. J.F.de Haan & P. Veefkind, KNMI)

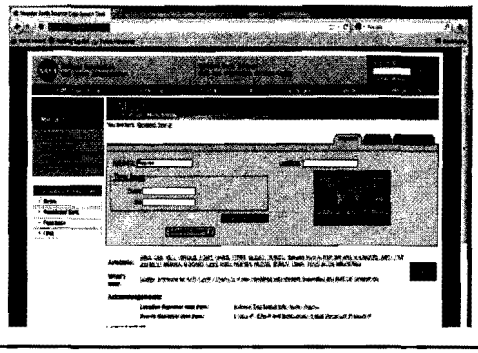
Data Access and Visualization

- Mirador

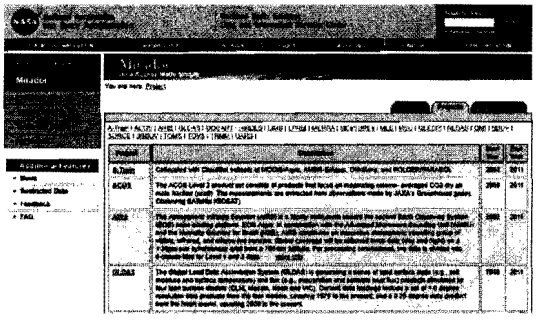
  Data Access Made Simple
- Giovanni

  Online Visualization and Analysis

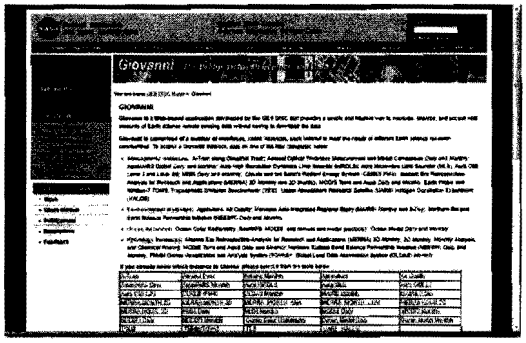
Mirador: mirador.gsfc.nasa.gov



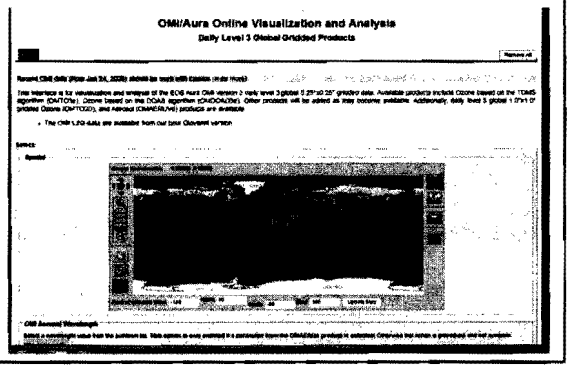
Data Access through Mirador



Giovanni: giovanni.gsfc.nasa.gov



OMI Data Online Visualization on Giovanni



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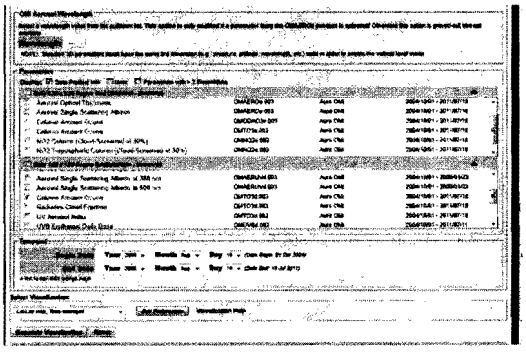
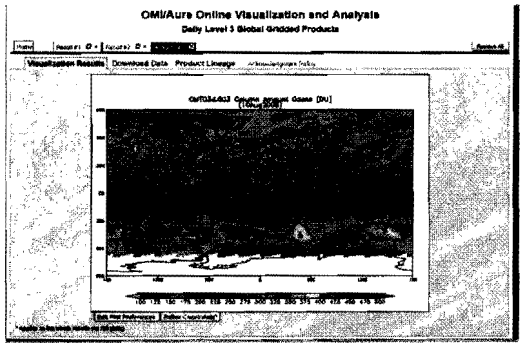


OMI Data Online Visualization on Giovanni



Data Quality

- Inconsistency from different sensors
- Different algorithm versions
- Quality Assessment
- Quality Flag
- Anomaly

Ozone Data in the Future

- NPP & NPOESS
- Metop
- ISS
- .....

Need Help?

- help-disc@listserv.gsfc.nasa.gov
- mirador-disc@listserv.gsfc.nasa.gov
- giovanni-disc@listserv.gsfc.nasa.gov